THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
THE ACADEMIC YEAR 2023/2024 – SEMESTER I

BACHELOR OF PHARMACY HONOURS
FMU3302 – PHYSICAL PHARMACY – LEVEL 3
FINAL EXAMINATION
DURATION: THREE (03) HOURS

DATE: 19TH MARCH 2024 **TIME: 9.30 A.M. – 12.30 P.M.**

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Part B- Short Answer Questions (20 Marks)

1.

1.1 List the three (03) types of thermodynamic systems. (03 marks)

I.....

II.....

III.....

1.2 Write the thermodynamic equations expressing the following.

1.2.1 Change of Entropy (ΔS):

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1.2.2 Change of Enthalpy (ΔH):

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1.2.3 Change of Gibb's free energy (ΔG):

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(06 marks)

1.3 Comment on the sign of the value (negative or positive) of each mentioned in 1.2, in a spontaneous chemical reaction at all temperatures. (01 mark)

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2.

2.1 List the two (02) types of diffusion processes. (02 marks)

I.....

II.....

2.2 What is the difference between the two types of diffusion processes in 2.1? (01 mark)

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2.3 During stability testing, an initial assay of drug A in a solution indicated a concentration of 11 mg/mL. However, 18 hours later the same assay showed only 8.4 mg/mL of drug A. As the rate of reaction decreases the concentration of drug A decreases.

Integrated rate equation for first-order kinetics;

$$\ln[A]_t = \ln[A]_0 - kt$$

Integrated rate equation for zero order kinetics;

$$[A]_t = [A]_0 - kt$$

Shelf-life for zero order kinetics $= \frac{0.1\,[A]_0}{k}$

Shelf-life for first order kinetics $= \frac{0.105}{k}$

2.3.1 What is the reaction order best explains the kinetics of above reaction? (01 mark)

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2.3.2 Calculate the rate constant for the degradation of the drug A. (03 marks)

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2.3.3 Calculate the shelf-life of the drug A. (03 marks)

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Part C – Structured Essay Questions (60 Marks)

Answer all the questions.

1.

1.1 State three (03) types of non-Newtonian fluid behaviours. (03 marks)

1.2 What is meant by thixotropic behaviour? (02 marks)

1.3 Briefly explain the rheological behavior of the following pharmaceutical formulations.

(a) Suspensions with deflocculated particles in non-Newtonian vehicles. (05 marks)

(b) Emulsions (05 marks)

2.

2.1 State three (03) main intermolecular forces that determine the thermodynamic solubility of crystalline solids in liquids. (03 marks)

2.2 Mention the mechanism of solubilization of polar compounds in polar solvents. (02 marks)

2.3 Briefly explain the deviations from Raoult's law and its effect on solubility. (05 marks)

2.4 Briefly explain the term 'critical solution temperature' and mention its importance in Pharmacy. (05 marks)

3.

3.1 Define the term adsorption. (01 mark)

3.2 Give two (02) examples of absorbents used in pharmaceutical applications. (02 marks)

3.3 State three (03) types of adsorption processes. (06 marks)

3.4 Briefly explain the effect of pH on the adsorption of weakly acidic drugs in an aqueous solution. (06 marks)

4.

4.1 Define the term 'zeta potential'. (03 marks)

4.2 State two (02) main mechanisms of colloid stabilization. (04 marks)

4.3 Explain how zeta potential can be changed to achieve effective colloidal removal. (08 marks)